From: Miller, Garyg

Sent: Friday, June 10, 2016 4:57 PM

To: Satya Dwivedula; Bob Allen; Linda Henry; Garry McMahan; Leah Oberlin (loberlin@poha.com);

angela.sunley@glo.texas.gov; Walker,Tina (DSHS)

Subject: FW: SJRWP Work Plan for Additional Probing - Western Submerged Area **Attachments:** Letter to G. Miller re Plan for Additional Cap Probing 06102016.pdf

FYI – cap probing work for next week.

Regards,

Gary Miller
Remedial Project Manager
EPA Region 6 Superfund Division, TX/Ark Section
214-665-8318
miller.garyg@epa.gov

From: Miller, Garyg

Sent: Friday, June 10, 2016 4:53 PM

To: 'John Laplante'

Cc: David Keith; 'Wendell Mears'; Sanchez, Carlos; Meyer, John; Tzhone, Stephen; Todd, Brandi; Leos, Valmichael;

Walters, Donn; Foster, Anne

Subject: FW: SJRWP Work Plan for Additional Probing - Western Submerged Area

John,

The EPA has reviewed and approves the attached plan. Please proceed with the work during the week of June 13, 2016 as described in the plan.

Regards,

Gary Miller
Remedial Project Manager
EPA Region 6 Superfund Division, TX/Ark Section
214-665-8318
miller.garyg@epa.gov

From: John Laplante [mailto:jlaplante@anchorqea.com]

Sent: Friday, June 10, 2016 3:45 PM **To:** Miller, Garyg < Miller. Garyg@epa.gov>

Cc: John Verduin < <u>iverduin@anchorgea.com</u>>; David Keith < <u>dkeith@anchorgea.com</u>>; Phil Slowiak

<philip.slowiak@ipaper.com>; Moreira, Dave <Dmoreira@wm.com>; Wendell Mears <wmears@anchorgea.com>

Subject: SJRWP Work Plan for Additional Probing - Western Submerged Area

Gary -

As requested, attached is the requested work plan for probing in the submerged portion of the western cell at the SJRWP. Hard copies are being sent separately. Please let us know if you have questions or comments.



Regards,

John Laplante, P.E. Anchor QEA, LLC 720 Olive Way Suite 1900 Seattle, WA 98101

Office: 206.287.9130 Direct: 206.903.3323 Fax: 206.287.9131 Mobile: 206.795.2676



614 Magnolia Avenue Ocean Springs, Mississippi 39564 Phone 228.818.9626 Fax 228.818.9631

June 10, 2016

Gary Miller, Remedial Project Manager
U.S. Environmental Protection Agency, Region 6
Superfund Division (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: Plan for Additional Cap Probing of the Time Critical Removal Action Armored Cap, San Jacinto River Waste Pits Superfund Site, Channelview, Texas

Dear Gary:

In an email dated June 6, 2016, you directed the Respondents, McGinnes Industrial Maintenance Corporation and International Paper Company (Respondents), to prepare and submit by June 10, 2016 an inspection work plan for the western submerged area (Western Probing Area, Figure 1) of the armored cap constructed as part of the Time Critical Removal Action (TCRA) at the Site (Armored Cap). In particular, the email stated that the work plan should include a description of the initial construction and subsequent inspections and maintenance of the Armored Cap within the Western Probing Area. It also directed that the "inspection shall be done by probing using the same procedures that were used for the Eastern Cell" and should include a maintenance plan to address any areas determined during the inspection to require maintenance.

The following provides a brief summary of the construction, post-construction inspection and maintenance of the Armored Cap within the Western Probing Area, and then describes the proposed approach and procedures for completing the inspection and conducting any maintenance that may be required and a schedule for the inspection. The work set forth in this work plan constitutes additional work under Section 2.2 of the TCRA Operations, Monitoring, and Maintenance (OMM) Plan (October 2011).

Western Probing Area Construction and Post-Construction Inspections and Maintenance

Installation of the Armored Cap in the Western Probing Area was completed in July 2011. The Construction Plans (Attachment 1) and Technical Specifications (Attachment 2) for that effort, as approved by the United States Environmental Protection Agency (USEPA), are provided as attachments to this letter for your reference. The Armored Cap in the Western Probing Area consists of four types of armor stone – Armor Cap A, Armor Cap B/C, Armor Cap C and Armor Cap D (Figure 1). Each type of armor stone was subject to independent material gradation tests during construction as described in Section 3.2.5.2 of the Technical Specifications (Attachment 2). The results of the gradation tests of each armor stone type, showing compliance with the Technical Specifications, are shown in Table 1.

Table 1
TCRA Western Cell Armor Rock Gradations

Armor Rock A		Armor Rock B/C		Armor Rock C		Armor Rock D	
	Percent		Percent		Percent		Percent
Sieve Size	Passing	Sieve Size	Passing	Sieve Size	Passing	Sieve Size	Passing
6"	100	12"	100	12"	100	18"	100
3"	48	6"	31.3	6"	20	8"	20
#4	15	# 200	0.0	#200	< 1	# 200	0.0
#10	11	N/A	N/A	N/A	N/A	N/A	N/A
#200	0.6	N/A	N/A	N/A	N/A	N/A	N/A

Note:

N/A Not applicable

Design thickness for Armor Cap A, B/C, and C was 12 inches while the design thickness of Armor Cap D was 18 inches (except in a small portion of the Armored Cap, designated as "D24" in Figures 1 and 2, where the design thickness was 24 inches). Post-construction probing, conducted in July 2011 (Figure 2), confirmed the cap thickness met or exceeded design specification in all areas within the Western Probing Area. The details of the post-construction probing are presented in the Revised Final Removal Action Completion Report (Anchor QEA 2012). Attachment 1 illustrates the areas where geotextile and geomembrane were also installed in portions of the Western Probing Area. Due to difficulty with installation and concerns about negative impacts on slope stability, geotextile was not installed in the area within the Western Probing Area referred to as the Northwestern Area.

Confirmatory probing of the Western Probing Area was conducted after construction of the Armored Cap was completed in July 2011 (Figure 2). Additional probing of the Western Probing Area was conducted in December 2015 by USEPA during an inspection event by the USEPA Dive Team (Dive Team). This inspection event identified an area in which maintenance was conducted in December 2015, the location of which is shown in Figure 2. Further probing was conducted by the Dive Team in April 2016 as a continuation of the Dive Team's December 2015 inspection, and Respondents were later provided with the Dive Team Summary Report for April 3-9, 2016 (Dive Team Summary Report). Confirmatory probing in the Areas of Interest (AOIs) identified in the Dive Team Summary Report and determined to be located within the Armored Cap boundary was performed by representatives of the Respondents during two separate inspection events, one in April 2016 during the Dive Team inspection and a second inspection in May of 2016, as detailed in the TCRA Armored Cap - Response to Request Regarding Dive Team Summary Report for April 3-9, 2016, submitted to USEPA on June 6, 2016, (Anchor QEA 2016a). Respondents' probing inspection events did not confirm the Dive Team's results.

Work Plan for Probing Inspection of the Western Probing Area

As directed by USEPA, the following work plan is based on the USEPA-approved procedures that were used in the April 2016 probing inspection of the Eastern Cell (Anchor QEA 2016b) and those used for the other maintenance activities on the Northwestern Area of the Armored Cap in December 2015 (Anchor QEA 2015). The planned probe layout is provided in Figure 1. Proposed new probe locations, depicted in blue, will be spaced roughly equidistant from the July 2011 post-construction probe locations, which are depicted in Figure 1 as black X marks. Approximately 80-100 new locations are proposed for probing. The AOIs identified in the Dive Team Summary Report and located within the Armored Cap boundary are included as probing locations. As shown on Figure 1, there are currently four porewater samplers installed in the Western Probing Area. As discussed with USEPA on June 9, 2016, no probing will occur within 15 feet of these locations. If these areas in which porewater samplers are installed overlap with these AOIs, or the areas around the porewater samplers require additional probing based on the results of this survey, that probing will be completed after the porewater samplers are retrieved. The samplers are currently scheduled to be retrieved the week of July 18, 2016.

A differential GPS unit will be used to locate sample stations. At each station, the probing team will use a combination of a $\frac{1}{2}$ inch \times 10 or 20 foot steel rebar, a 1 inch \times 10 or 20 foot plastic pipe, and a three piece 2 inch diameter aluminum pipe in 12 foot segments. The aluminum probe could be coupled to provide a 36 foot long probe in deep water. The probe will be placed on top of the cap and a measurement of probe depth will be made. Subsequently, the probe will be advanced through the cap, and a measurement of probe depth will be made at the contact elevation between the bottom of the armor rock, and either the geotextile, or the native sediment depending on location. The difference in the two measurements will be recorded as the armor rock thickness.

AOIs identified in the Dive Team Summary Report will also be re-probed in locations 3 to 5 feet in all principal directions (north, south, east, and west). If the probing team is unable to determine if Armored Cap material is present at the minimum design thickness due to inability to penetrate the Armored Cap at the particular location, the team will move the probing location the minimum distance possible in an attempt to achieve successful penetration. Data, including waypoint IDs, thickness of Armored Cap material, and sample times, will be recorded for each station. Any areas identified as potentially not meeting the design criteria (Maintenance Location) will then be delineated by probing at approximate 5 foot intervals along a series of transects to determine any locations in which cap material may not be present at the TCRA design minimum thickness.

Potential Cap Maintenance Plan

If any maintenance of the Armored Cap is required, it will generally be performed as described in the USEPA-approved work plan for the Northwestern Area in December 2015 (Anchor QEA 2015). With respect to the Western Probing Area, armor rock will be placed over each Maintenance Location to assure that the design thickness of armor rock is present. As part of the USEPA-approved OMM Plan, two stockpiles of armor rock (Armor Rock C and Armor Rock D) were purchased and staged nearby. Armor Rock C would be used in any Maintenance Location currently containing Armor Rock A, B/C, or C. Armor Rock C is larger than or equivalent to the size of the Armor Rock A, B/C, and C used during construction of the Armored Cap in the Western Probing Area, and it will provide long-term reliability of the cap surface from currents, winds, and waves in these Maintenance

Locations. Armor Rock D will be used if a Maintenance Location is located in an area in which the Armored Cap was constructed using Armor Rock D.

Work will be conducted by the Respondents' on-call contractor USA Environmental, LP (USA) and/or Benchmark Ecological Services Inc. (BESI). Access to the Maintenance Locations from the land side may be necessary due to shallow water conditions. The following are additional details regarding the work:

- Armor Rock C is currently present in the stockpile area at the entrance to the Armored Cap. Armor Rock D or additional Armor Rock C will be delivered if and as needed. Rock would be delivered using dump trucks to the stockpile area at the southeastern entrance to the Armored Cap outside of the TxDOT right-of-way.
- Small equipment would be used to move rock from the delivery location to the shoreline near the Maintenance Locations.
- The rock would be transferred from the stockpile to the Maintenance Locations using a small pontoon boat or other work boat. The work boat would then be positioned over the Maintenance Location and the rock would be unloaded and placed in the Maintenance Locations.
- A geotextile layer may be added to a Maintenance Location prior to placing the rock, if the engineer of record and USEPA determine the site conditions are conducive to its placement. The decision for placement of geotextile will depend on depth of overlying sediment and slope, with the final determination made in coordination with the USEPA.
- This process would be similar to maintenance activities performed in the Northwestern Area during the week of December 23, 2015, and in the Eastern Cell in March 2016.

A field summary report will be prepared and will include a figure showing each Maintenance Location. A table will also be provided with coordinates for each sample location.

Schedule

The proposed probing inspection will begin during the week of June 13, 2016, subject to USEPA approval, and if weather, tides, and access conditions allow those activities. The

probing inspection is anticipated to take less than one week to complete, other than any additional probing conducted after porewater samplers are removed. A schedule for any maintenance activities would be provided following completion of the probing work.

Please let us know if you have any concerns with the proposed inspection activities, and do not hesitate to contact me if you would like to discuss anything.

Sincerely,

David C. Keith, Ph.D., R.G., C. HG.

Saviel C. Kind

Anchor QEA, LLC

Cc: Dave Moreira, MIMC
Phil Slowiak, IP
John Verduin, P.E., Anchor QEA
John Laplante, Anchor QEA
Wendell Mears, Anchor QEA

References

Anchor QEA, 2011. Operations, Monitoring, and Maintenance (OMM) Plan. San Jacinto River Waste Pits Superfund Site October 2011.

Anchor QEA, 2012. *Revised Draft Final Removal Action Completion Report*. San Jacinto River Waste Pits Superfund Site. March 9, 2012.

Anchor QEA, 2015. Revised Work Plan for Rock Placement on the Time Critical Removal Action Armored Cap. San Jacinto River Waste Pits Superfund Site. December 2015.

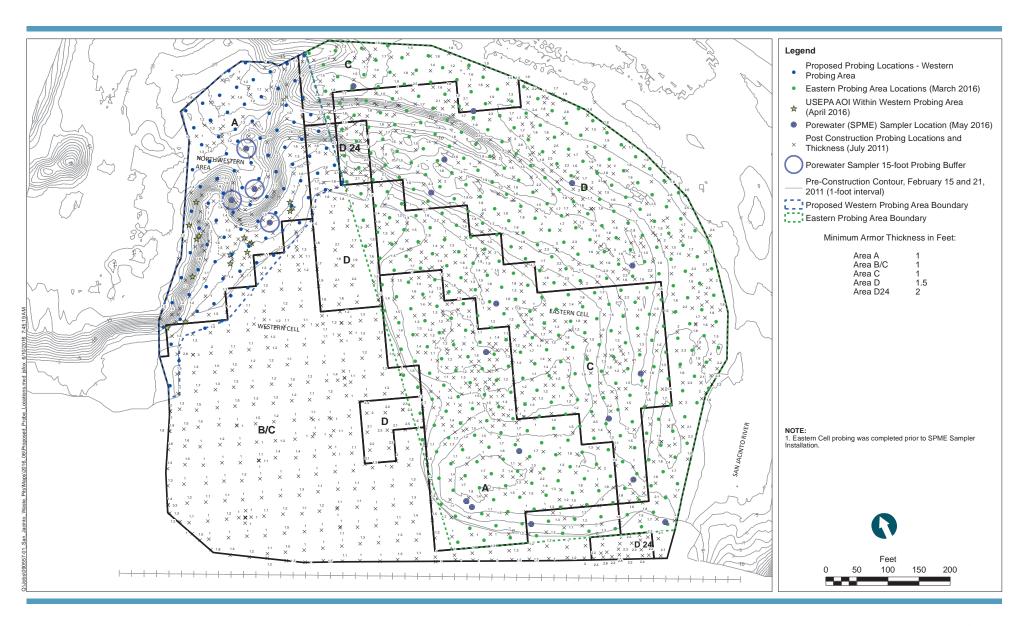
Anchor QEA, 2016a. *TCRA Armored Cap - Response to Request Regarding Dive Team Summary Report for April 3-9, 2016.* San Jacinto River Waste Pits Superfund Site. June 6, 2016.

Anchor QEA, 2016b. Work Plan Letter to G. Miller from D. Keith. Proposed Plan for Additional Cap Probing on the Time Critical Removal Action Armored Cap, San Jacinto River Waste Pits Superfund Site, Channelview, Texas. March 16, 2016.

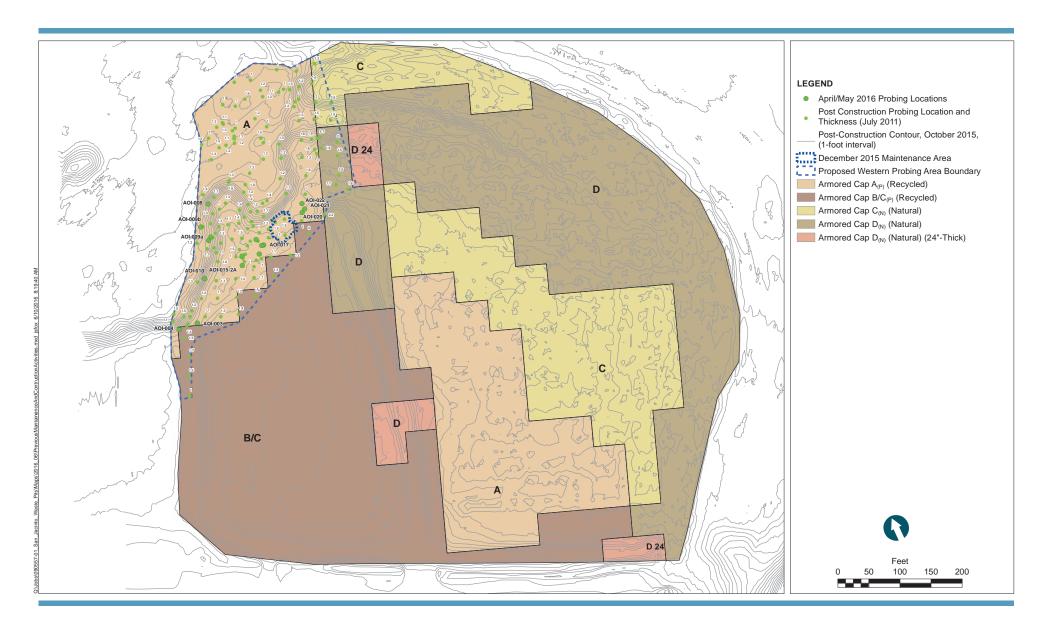
Attachments

Attachment 1 Construction Plans
Attachment 2 Technical Specifications

FIGURES







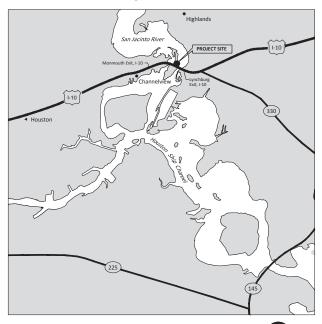


ATTACHMENT 1 CONSTRUCTION PLANS

TIME CRITICAL REMOVAL ACTION SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

CHANNELVIEW, HARRIS COUNTY, TEXAS

VICINITY MAP



SITE MAP



DRAWING INDEX

HEET SEQUENCE	SHEET NO.	SHEET TITLE
1	T-1	COVER SHEET
2	G-1	SURVEY CONTROL PLAN
3	C-1	GEOMEMBRANE LOCATION PLAN
4	C-2	CAPPING PLAN
5	C-3	CROSS SECTIONS
6	C-4	CROSS SECTIONS
7	C-5	CROSS SECTIONS
8	C-6	CROSS SECTIONS
9	C-7	DETAILS



GENERAL NOTES

- 1. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF PROJECT SPECIFICATIONS, PERMITS AND ALL APPLICABLE REGULATIONS AND ORDINANCES.
- 2. THE CONTRACTOR SHALL AT ALL TIMES KEEP ITS CONSTRUCTION AREAS FREE FROM ACCUMULATIONS OF WASTE MATERIALS OR RUBBISH; AND PRIOR TO COMPLETION OF THE WORK, THE CONTRACTOR SHALL REMOVE ANY RUBBISH FROM THE PREMISES AND ALL TOOLS, EQUIPMENT, AND MATERIALS
- 3. THE CONTRACTOR SHALL MAINTAIN SUITABLE VESSEL TRAFFIC SAFETY SIGNS, EQUIPMENT AND MANPOWER TO PROVIDE VESSEL TRAFFIC CONTROL. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND EQUIPMENT NECESSARY TO MAINTAIN THE WATERWAYS FREE OF WASTE AND/OR DEBRIS RESULTING FROM PROJECT OPERATIONS.
- 4. OVERHEAD OR UNDERGROUND UTILITY LINES THAT MAY BE PRESENT ON OR NEAR THE PROPERTY ARE NOT SHOWN. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF ALL UTILITY LINES.
- 5. FOR ALL SHEETS, HORIZONTAL DATUM IS TEXAS STATE PLANE SOUTH CENTRAL ZONE, NAD 83. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88). ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
- 6. TOPOGRAPHY AND BATHYMETRY HAS BEEN COMPILED FROM A FEBRUARY 16, 2009 AND JUNE 12, 2010 SURVEY CONDUCTED BY HYDROGRAPHIC CONSULTANTS, LTD OF BELLAIRE, TEXAS.



SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

TIME CRITICAL REMOVAL ACTION

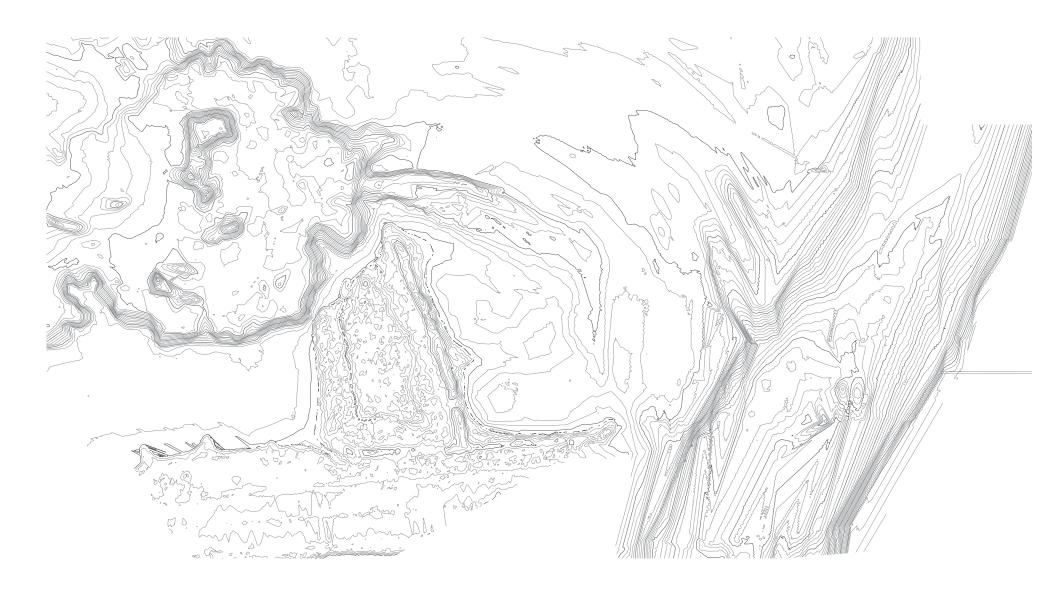
JOHN VERDUIN, PE 83802 ANCHOR QEA, L.L.C. (F-3617) DECEMBER 23, 2010

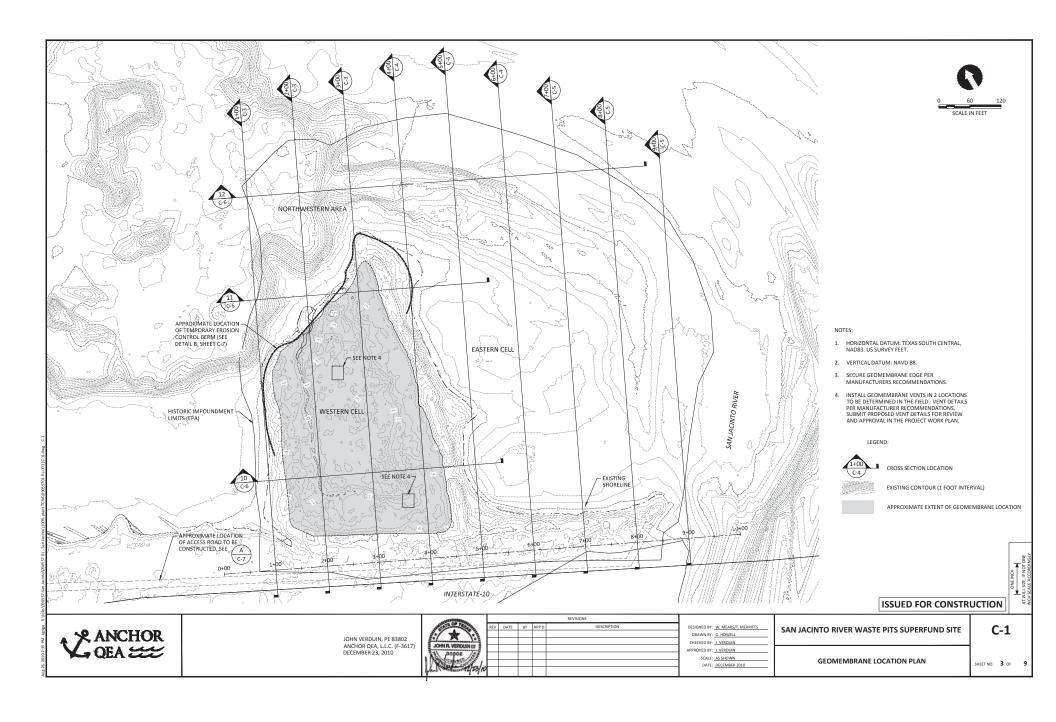
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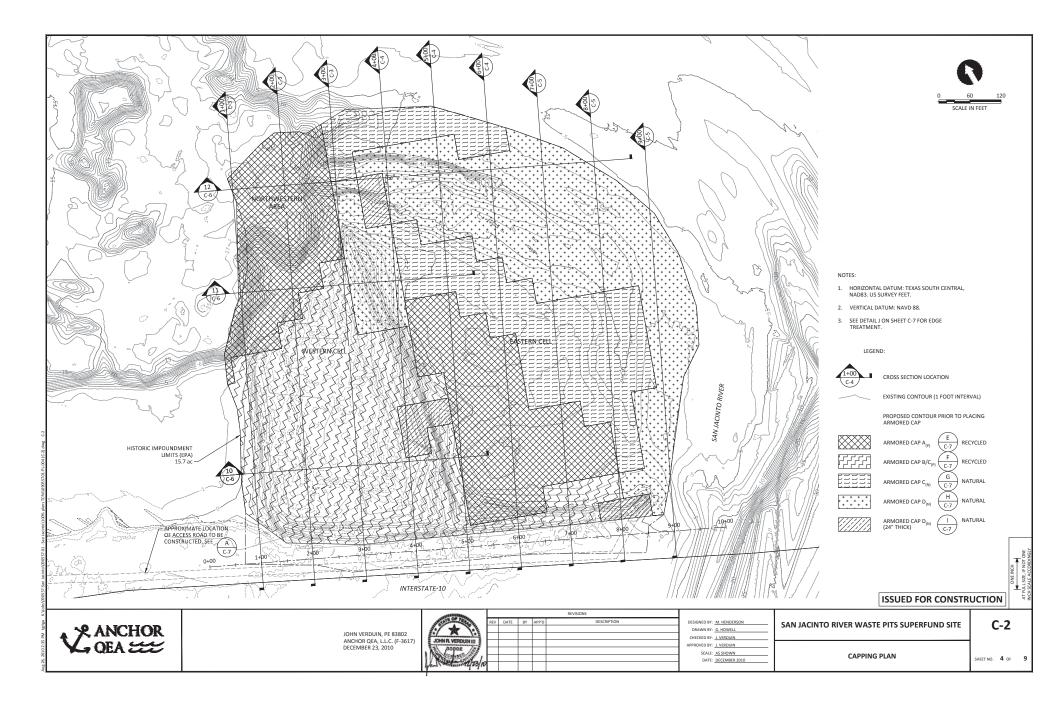
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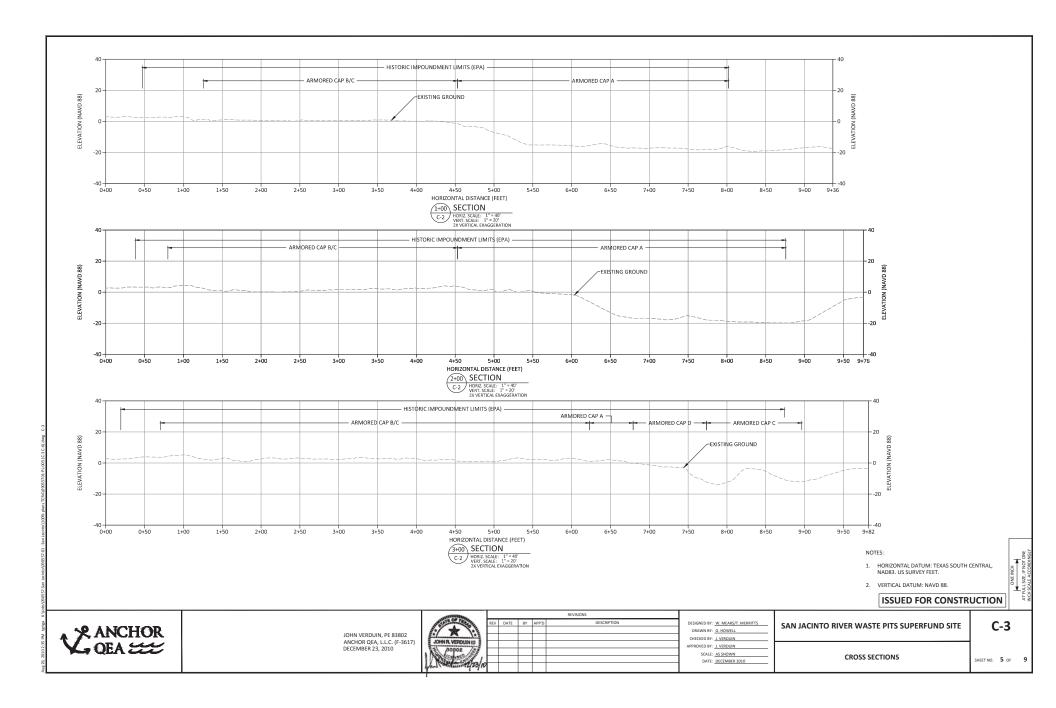
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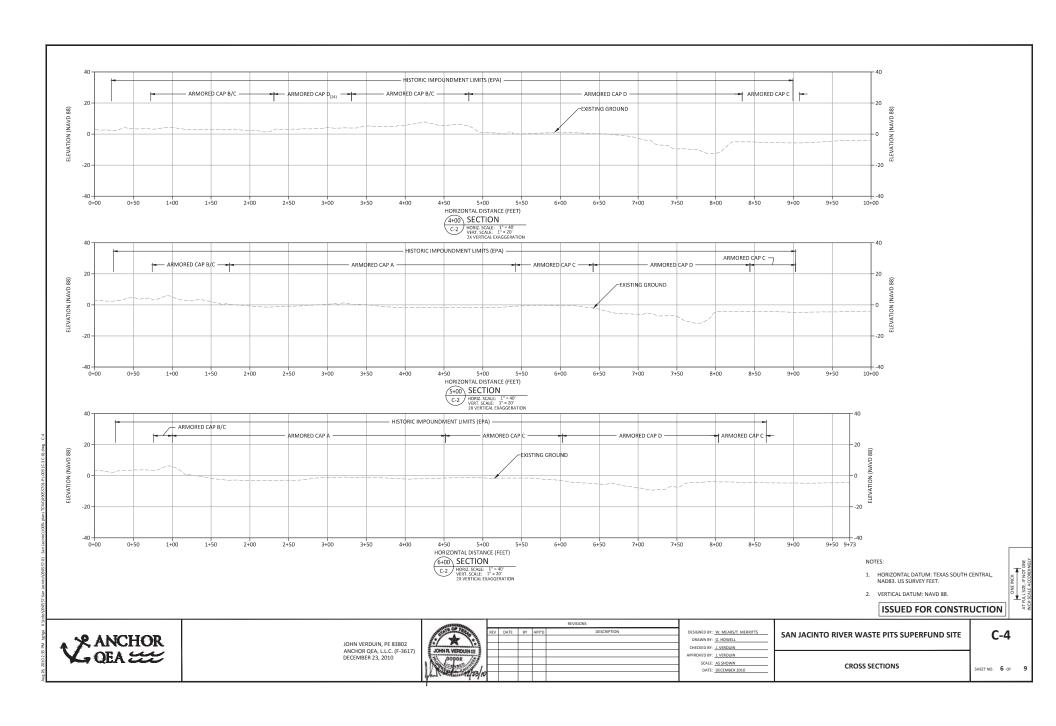
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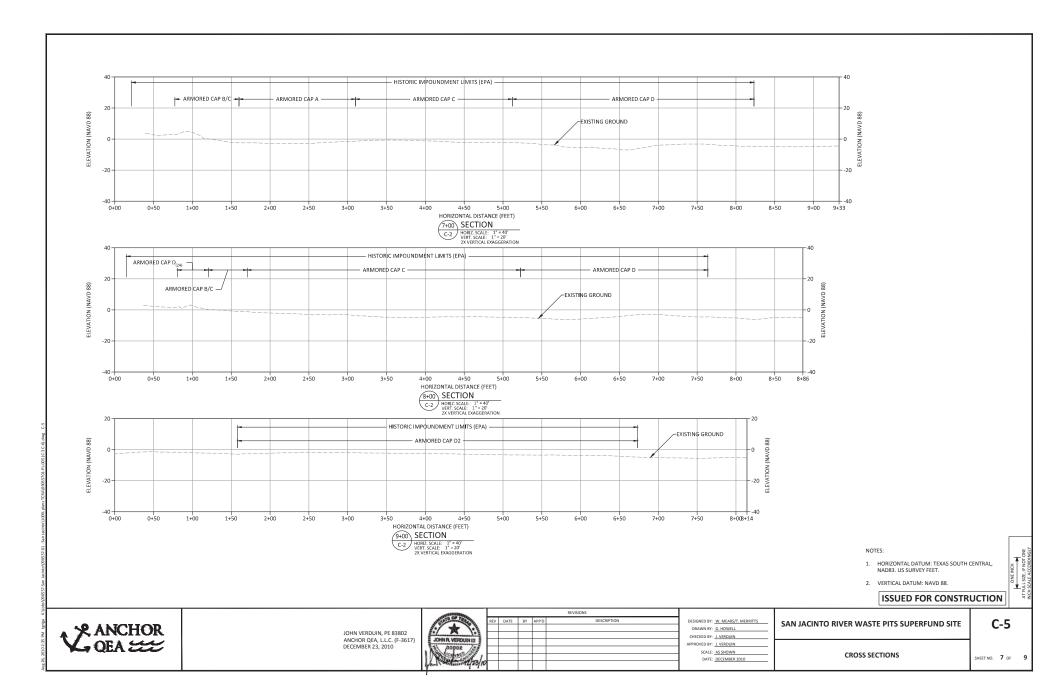


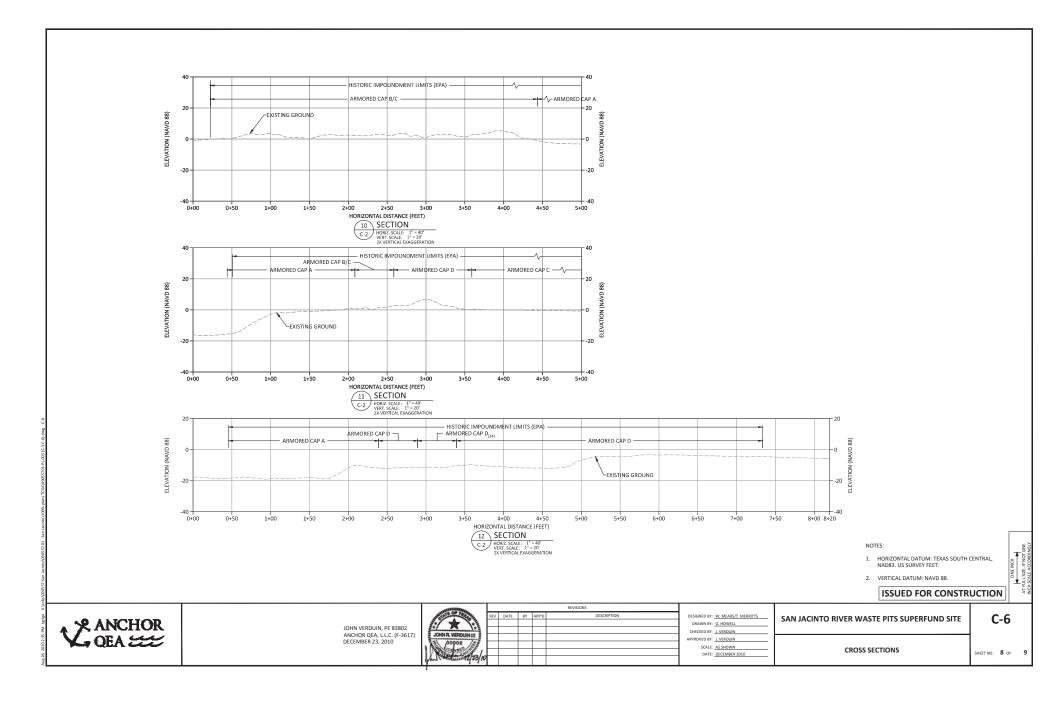


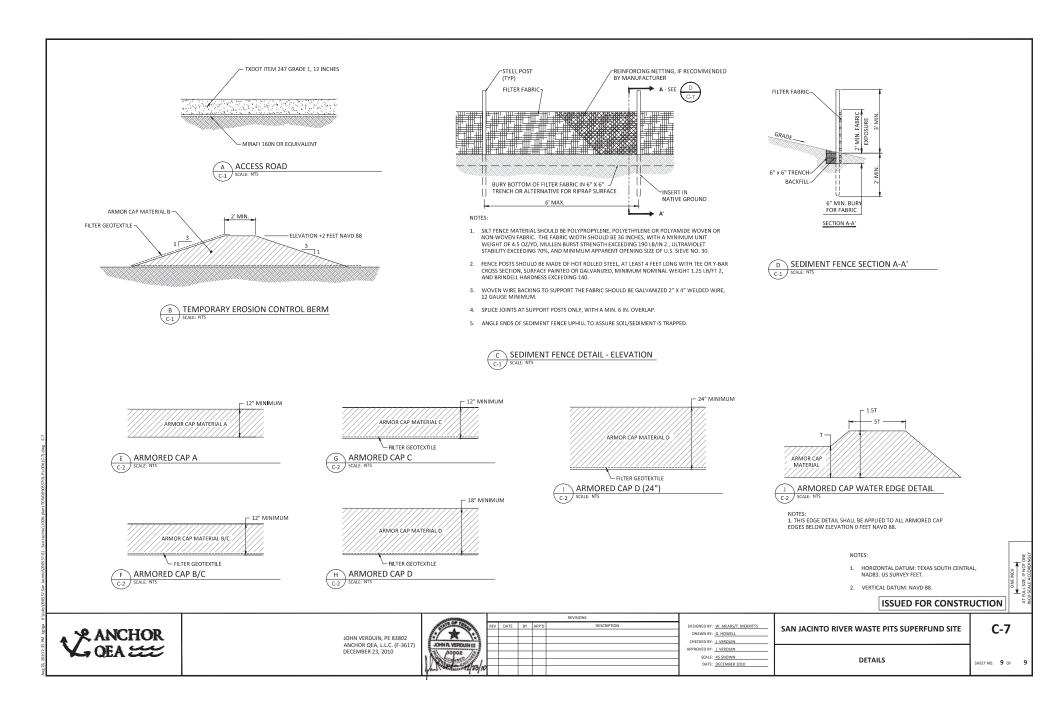












ATTACHMENT 2 TECHNICAL SPECIFICATIONS

APPENDIX C TECHNICAL SPECIFICATIONS SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

Prepared for

U.S. Environmental Protection Agency, Region 6

On behalf of

McGinnes Industrial Maintenance Corporation and International Paper Company

Prepared by

Anchor QEA, LLC 614 Magnolia Avenue Ocean Springs, Mississippi 39564 John Verduin, PE 83802 Anchor QEA, LLC (F-3617) January 2011

January 2011

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Table 2 Schedule of Values – Bid Table

Attachments

Attachment A Standard General Conditions of the Construction Agreement

Attachment B Reference Drawings

LIST OF ACRONYMS AND ABBREVIATIONS

BMPs best management practices
CFR Code of Federal Regulations

CHASP Contractor health and safety plan

CIH certified industrial hygienist

CQAP construction quality assurance plan

CQC construction quality control

CWP Contractor work plan

EPP environmental protection plan

NAD North American Datum

NAVD 88 North American Vertical Datum of 1988

NTCRA non-Time Critical Removal Action

RAWP removal action work plan

RTK real-time kinematic

Site San Jacinto River Waste Pits Superfund Site

SSP Site security plan

TESC temporary erosion and sedimentation control

TCRA Time Critical Removal Action

TxDOT Texas Department of Transportation

USEPA United States Environmental Protection Agency

1 INTRODUCTION

1.1 TCRA Objectives

The objectives of the Time Critical Removal Action (TCRA) at the San Jacinto River Waste Pits Superfund Site (Site) are to:

- Control erosion of waste materials
- Prevent direct human contact with the waste materials
- Prevent benthic contact with the waste materials

The TCRA will ultimately be part of the overall non-Time Critical Removal Action (NTCRA) or final remedy, which will address the Site and surrounding areas. The time between the TCRA completion and the NTCRA or final remedy is anticipated to be 2 to 7 years.

1.2 Summary of Work

A summary of the work to be performed by the Contractor to complete the TCRA is outlined in these Technical Specifications and includes, but is not limited to, the following:

- Project Set Up
 - Mobilizing and demobilizing all personnel, equipment, supplies, offices, and other facilities necessary for the work.
 - Develop and implement a Site health and safety program.
 - Develop and implement a Site quality control program.
 - Develop and implement a Site security program.
 - Develop and implement an environmental protection program.
 - Conduct in-progress surveys of the work during construction to track progress and adjust cap placement operations as necessary.
 - Construct an access road and laydown area.
- Eastern Cell Protection
 - Implement erosion control measures as shown on Drawings.
 - Grade miscellaneous areas as necessary.
 - Construct an Armored Cap to the extents shown on the Drawings.
- Western Cell Protection

- Clear and grub to the extents shown on the Drawings, removing off-site vegetative material above grade. Smaller roots will be left on-site.
- Implement erosion control measures as shown on Drawings.
- Grade miscellaneous areas as necessary.
- Construct an Armored Cap to the extents shown on the Drawings.
- Northwestern Area Protection
 - Construct an Armored Cap to the extents shown on the Drawings.

1.3 Terms and Conditions

Standard General Conditions of the Construction Agreement are provided as Attachment A.

2 CONSTRUCTION SEQUENCING, TIMING, AND OPERATIONS CONSTRAINTS

2.1 Anticipated Sequencing of Construction

The Contractor shall sequence their work in a manner that minimizes disturbance to other TCRA elements already completed. Work involving material placements shall generally be constructed from the lower elevations upward. Work within intertidal areas shall be sequenced to minimize the potential for erosion.

2.2 Timing

Based on the current schedule, construction activities shall commence within 30 days of United States Environmental Protection Agency (USEPA) approval of the Removal Action Work Plan. The Contractor will develop a project schedule that is subject to review and approval of USEPA. The work shall be completed within 1 year of commencement of construction activities.

2.3 Operations Constraints

The Site is adjacent to the San Jacinto River, Interstate 10, and residential and industrial areas. The Contractor shall be aware of, and follow, regulations related to working adjacent to these areas.

Material stockpile and equipment laydown locations that are available to the Contractor will be determined at a later date. Excavated materials from the Site shall not be transported to or stored offsite. As a condition of its use, upon demobilization, the Contractor shall leave the offsite properties in a condition at or better than its current condition. Any improvements made to the offsite properties shall be left in-place upon request of the property owner.

3 CONSTRUCTION ELEMENTS

The TCRA includes the following construction elements, which are described in further detail below:

- Project Set Up
- Armored Cap Construction

Cap construction will consist of both upland and in-water construction of an Armored Cap to protect the Eastern Cell, Western Cell, and Northwestern Area portions of the Site.

3.1 Project Set Up

Project set up includes all activities performed prior to, and in preparation for, TCRA activities and also includes demobilization following the completion and acceptance of construction. This element includes the following tasks:

- Mobilization and Demobilization
- Health and Safety
- Construction Quality Control
- Site Security
- Environmental Protection
- Survey Control
- Access Road Construction
- Off site properties Improvements

3.1.1 Mobilization and Demobilization

3.1.1.1 Description of Work

Work shall include costs necessary for mobilizing and demobilizing all personnel, equipment, supplies, offices, and other facilities necessary for the work, surveying, and cleanup. Provide and maintain sanitary facilities in sufficient numbers and at suitable locations for the use of all persons employed on the work Site. Provide sufficient drinking water for all employees. Mobilization shall consist of pre-construction expenses and costs or preparatory work and operations performed by the Contractor that occur before 10 percent of the Awarded Contract Price is earned from the other respective Bid Items.

Demobilization shall consist of post-construction expenses and work that occurs after 95 percent of the Awarded Contract Price is earned from other Bid Items.

Attachment B provides reference Drawings for known utilities that occur on or adjacent to the Site. These Drawings are provided for the Contractor's reference only and no representation as to the accuracy of these Drawings is implied by their inclusion in the Contract Documents. For purposes of completing the Work, the Contractor shall consider utility identification to be incomplete. The Contractor is responsible for identifying and marking utilities within the work area in accordance with Texas One-Call law, and for protecting utilities throughout the duration of construction activities. The Contractor shall be responsible for any and all damage to any existing utilities caused by the Contractor's efforts.

3.1.1.2 Materials and Quantities

Not applicable to this Bid Item.

3.1.1.3 Assumptions and Restrictions

Overnight and daily parking of vehicles and equipment limitations are governed by the access agreement between TxDOT and the owners.

3.1.1.4 Submittals

The Contractor shall submit a Construction Work Plan (CWP) to Engineer for review and approval prior to mobilization to the Site. The CWP shall include, at a minimum, the following:

- Project schedule
- Proposed subcontractor(s) and their role(s)
- Procedures for identifying below-grade utilities in the work areas
- Proposed equipment and materials
- Methods for mobilizing equipment and materials to the Site
- Source(s) for cap materials, borrow source characterization reports, and analytical results

- Sources of geomembrane and geotextile materials
- Methods for installing the Armored Cap over the eastern Cell
- Methods for clearing and grubbing the western Cell
- Methods for installing and protecting the geomembrane in the western Cell
- Methods for quality control of geomembrane seaming
- Methods of ensuring no tracking of Site soils off-site
- Methods for grading the western Cell
- Methods for installing the Armored Cap over the western Cell
- Methods for installing the Armored Cap over the northwestern Area
- Demobilization
- Additional information as requested elsewhere in these specifications

The Contractor shall provide written notification of intent to commence work a minimum of seven days prior to the Contractor's scheduled date to commence work.

Following the completion of construction, the Contractor shall submit as-built Drawings and related documentation to Engineer within 15 days of substantial completion. Contractor shall also submit a copy of its field notes upon request.

3.1.1.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.2 Health and Safety

3.1.2.1 Description of Work

The Contractor will be responsible for safety and health for Site workers and the adjacent community during the implementation of the TCRA. The Contractor shall meet all provisions of local, state, and federal safety standards for construction. All Contractor activities shall comply with Hazardous Waste Operation and Emergency Response, 29 Code of Federal Regulations (CFR) 1910.120, where applicable.

The Contractor shall have a Health and Safety Representative, who shall, at a minimum be a Certified Industrial Hygienist (CIH). The Contractor shall also designate a full-time Site Safety Officer to monitor work efforts, verify that employees of the Contractor and subcontractors are in compliance with the requirements of the Contractor's Health and Safety Plan (CHASP), and determine the need for additional worker protection. All workers shall have the necessary health and safety training needed to comply with work on the Site.

3.1.2.2 Materials and Quantities

Not applicable to this Bid Item.

3.1.2.3 Submittals

The Contractor shall submit a Contractor Health and Safety Plan (CHASP) to Engineer for review. The CHASP shall be prepared in accordance with the requirements of 29 CFR 1910.120 and 29 CFR 1926.65 and all other applicable OSHA regulations and published guidelines. The CHASP shall clearly define health and safety requirements for specific Site activities. The CHASP shall include employee training and medical certificates as appropriate.

The Contractor shall submit to Engineer amendments to the CHASP as appropriate throughout the duration of the Work. Activities related to the CHASP amendment shall not begin until the amendment has been submitted and reviewed.

3.1.2.4 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.3 Quality Control

3.1.3.1 Description of Work

The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the specifications, including those performed by subcontractors. As part of this program, the Contractor shall establish, provide, and maintain a Construction Quality Control (CQC) Plan. The Contractor shall also establish a CQC Supervisor. Daily CQC reports shall be submitted each day for the previous day's activities. Equipment and materials necessary for the CQC Plan shall be considered incidental to the different construction elements.

3.1.3.2 Materials and Quantities

Not applicable to this bid item.

3.1.3.3 Submittals

Contractor shall submit a Construction Quality Control (CQC) Plan to Engineer for review and approval. The CQC Plan shall detail the methods and procedures that will be taken to ensure that all materials and completed construction elements conform to contract Drawings, technical specifications, and other requirements, whether these elements be manufactured by the Contractor or procured from subcontractors or vendors. The CQC Plan shall specify the name and qualifications of the Contractor's proposed CQC Supervisor.

Daily CQC reports shall be submitted to Engineer each day for the previous day's activities. Daily CQC reports shall be submitted by noon on the following work day. Daily quantities of materials delivered to the Site, and quantities of materials graded and placed, shall be submitted in the daily CQC reports.

3.1.3.4 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.4 Site Security

3.1.4.1 Description of Work

The Contractor shall be responsible for providing Site security during all construction activities, both during working and non-working hours. The primary intent of Site security measures shall be to restrict access to remedial work areas at the Site as necessary. Those workers entering remedial areas shall have appropriate training as defined in the CHASP. The security measures are also intended to prevent exposure of the public and non-authorized personnel to Site contaminants, and to minimize the incidence of Site theft. As part of this program, the Contractor shall establish, provide, and maintain a Site Security Plan (SSP) and enforce compliance with its provisions by all Contractor and subcontractor employees.

The Contractor shall maintain a daily log of visitors to the Site and make available to the Engineer on request. The visitor's log shall include date, name, address, company employed by, time in and time out, and a record of deliveries. Security breaches or incidents shall also be recorded on the visitor's log.

3.1.4.2 Materials and Quantities

Not applicable to this Bid Item.

3.1.4.3 Assumptions and Restrictions

The Contractor may make no claim against the Owner or Engineer for damage resulting from trespass.

3.1.4.4 Submittals

The Contractor shall submit a Site Security Plan (SSP) to Engineer for approval, detailing the methods and procedures that will be taken to ensure that the Site is secured during working and non-working hours.

3.1.4.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.5 Environmental Protection

3.1.5.1 Description of Work

The Contractor shall establish an Environmental Protection Program that prevents environmental pollution, establishes temporary erosion and sedimentation controls (TESCs), and minimizes environmental degradation during, and as a result of, construction operations. The control of environmental pollution requires consideration of noise levels, air, water, and land.

This task should include costs for preparation of an Environmental Protection Plan (EPP), costs for purchase, installation, and maintenance of silt fences, silt curtains, and other measures identified in the EPP, and costs for inspections of installed environmental protection measures. The task shall also include costs to prevent the off-site transport of materials on equipment leaving the Site.

3.1.5.2 Materials and Quantities

A silt fence shall be constructed around all upland construction activities. A silt curtain shall be installed around all in-water construction activities. The silt curtain shall be supported by floats at the top and weighted at the bottom. The silt curtain bottom shall be within 3 feet of the mudline at all times.

The Contractor shall install a Temporary Erosion Control Berm as shown on the Drawings. The intention of the berm is to control erosion of surface materials with the rising and falling of the tide and San Jacinto river levels. Temporary silt fences shall be installed around the perimeter of the construction area to minimize erosion of exposed soils into the river.

The Contractor shall purchase and install four signs offshore at the outer edges of the Site notifying mariners to stay out of the area.

3.1.5.3 Assumptions and Restrictions

The Contractor can assume that the Engineer will perform all water quality monitoring during in-water activities. If water quality exceedances occur during material placement, Contractor shall be responsible for adjusting its operations or environmental protection controls, as necessary, to achieve water quality monitoring results in compliance with relevant standards. Contractor shall not be paid standby time if operations must be temporarily suspended due to water quality monitoring results in exceedance of relevant standards.

3.1.5.4 Submittals

The Contractor shall submit an Environmental Protection Plan (EPP) to Engineer for approval, which shall establish and maintain quality control for environmental protection of all items of the TCRA. At a minimum, the EPP shall include the following information:

- Proposed materials and methods to control erosion and turbidity
- Description of procedures for prompt maintenance and repair of installed erosion and turbidity controls
- Sheen and floating debris control measures
- Description of control procedures to decontaminate trucks importing fill material prior to the trucks leaving the Site (e.g., inspecting and brushing off visible dirt, wheel washing)
- Description of methods to decontaminate any equipment leaving the Site
- Description of measures to minimize wheel contact of trucks entering and leaving the
 Site with the exposed subgrade
- Site planning showing the location of TESC measures
- Fueling plan
- Emergency procedures to respond to a fuel spill on land or over water
- Methods to control dust for access road and other areas of the Site
- Description of best management practices that will be used to prevent or minimize stormwater from being exposed to pollutants from spills, cleaning and maintenance

activities, and waste handling activities, including fuel, hydraulic fluid, and other oils from vehicles and machinery

- Projected date when TESC measures will be in place
- Projected date of removal of TESC structures (after soil is stabilized by vegetation or other means)

Any requested changes or modifications to the TESC measures shown on the Drawings shall be submitted in writing to the Engineer for approval prior to implementation.

3.1.5.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.6 Survey Control

3.1.6.1 Description of Work

An accurate method of horizontal and vertical control shall be established by the Contractor before work begins. The Contractor shall lay out its work from horizontal and vertical control points indicated on the figures and shall be responsible for all measurement taken from these points.

Accuracy for topographic surveys completed for upland work shall be to the nearest 0.01-foot ± 0.005 -foot for elevation and to ± 0.1 -foot for horizontal distance.

The Contractor shall establish and maintain a tide gauge or board in a location where it may be clearly seen during in-water work. The Contractor shall employ a suitable method to locate and control horizontal and vertical in-water work. The Contractor is required to have real-time kinematic (RTK) controls for survey control work. Accuracy for measured depths for in-water work shall be ± 0.25 foot; accuracy of horizontal positions shall be ± 3 feet at the 95 percent confidence interval.

The Contractor shall safeguard all survey control points. Should any of these points be damaged or destroyed, the Contractor shall replace the control point at no cost to the Owner or Engineer. The Contractor shall assume the entire expense of rectifying work improperly constructed due to failure to maintain and protect established survey control points.

3.1.6.2 Materials and Quantities

Not applicable to this Bid Item.

3.1.6.3 Assumptions and Restrictions

The horizontal datum shall be Texas South Central, North American Datum (NAD) of 1983. The vertical datum shall be NAVD 1988 (2001 Adjusted).

The Contractor can assume that the Engineer will be responsible for all pre- and post-activity payment surveys.

3.1.6.4 Submittals

As part of the Contractor's CWP, Contractor shall provide description of proposed survey equipment, qualifications of survey crew, and proposed survey control methods.

The Contractor shall provide cross sections of the installed work every two days during both in-water and upland work. The volume of material placed and the area affected shall also be determined every two days. The cross sections and volume calculation shall be submitted as part of the Daily CQC report by noon on the following work day.

Field notes shall be recorded during each survey event. Notes shall include weather conditions, equipment calibration records, time and date of measurements, surface water elevation measurements, surface water elevation, surface water conditions, etc. Contractor shall submit a copy of the survey field notes to the Engineer at the conclusion of construction.

If Contractor installs or replaces survey monuments during the completion of the work, Contractor shall provide a sealed survey of the monuments and verification that the survey was recorded in Harris County, within 15 days following the completion of work.

3.1.6.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.7 Access Road Construction

3.1.7.1 Description of Work

Access road construction shall be to the limits shown on the Drawings. The subgrade shall be cleared of vegetation and leveled prior to the road construction. A separation geotextile shall be placed over the cleared and leveled subgrade prior to placing aggregate. Geotextile panels shall overlap by a minimum of 2 feet. After completion of the TCRA, the access roads shall remain in place.

3.1.7.2 Materials and Quantities

The access road shall be a minimum of 12 feet wide, and in the general location shown on the Drawings. The road section shall be constructed of 12 inches of TxDOT Item 247, Grade 1 (Texas Department of Transportation 2004 Standard Specifications) over a separation geotextile specified by TxDOT.

3.1.7.3 Assumptions and Restrictions

Assume that no additional fill materials will be required to create manageable grades, nor will excess soils have to be removed. Vegetation above the subgrade removed as part of the activities shall be removed from the Site and properly disposed of. Any soil adhering to vegetation root wads that have been removed as part of grubbing shall be removed from the root wads and placed evenly within the Western Cell prior to Armor Cap construction.

3.1.7.4 Submittals

As part of CWP, include Contractor's proposed borrow source for TxDOT Item 247, Grade 1, and product information for Contractor's proposed separation geotextile.

3.1.7.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.1.8 Offsite Properties Improvements

3.1.8.1 Description of Work

Contractor shall make improvements to the offsite properties as deemed necessary by the Contractor for the completion of the TCRA.

3.1.8.2 Materials and Quantities

Not applicable to this Bid Item.

3.1.8.3 Assumptions and Restrictions

Assume that no structures currently existing at the offsite properties may be removed. The Contractor is responsible for identifying and marking utilities at the offsite properties in accordance with Texas One-Call law, and for protecting utilities throughout the duration of construction activities. The Contractor shall be responsible for any and all damage to any existing utilities caused by the Contractor's efforts. All proposed improvements to the offsite properties are subject to the approval of the Engineer and the property owner.

The Contractor shall provide for the duration of the Site work, an on-site field office complex with an office space of not less than 1,000 square feet, for exclusive use of Engineer and Government personnel. The above facility shall be located at the concrete slab located on the offsite properties as shown on the Drawings. The office may be a portable trailer or building. The field office shall be secured in place using tie downs capable of withstanding

winds of up to 75 miles per hour. The Contractor shall provide full electric, central Heating Ventilating and Air Conditioning (HVAC) system, water supply, and sewage removal utility services. The Contractor shall be responsible for physical and fire protection, security, repairs from vandalism, and replacements from theft of the office facility and contents. This facility shall be ready for occupancy within 30 days and fully completed within 45 days after acknowledgment of the Notice to Proceed and prior to any on-site construction activities.

3.1.8.4 Submittals

As part of CWP, include Contractor's proposed Site improvements for the offsite properties.

3.1.8.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.2 Armored Cap Construction

The extent of work for the Armored Cap construction is indicated on the Drawings. This element includes the following tasks:

- Clearing and grubbing
- Upland surface grading
- Geotextile placement
- Geomembrane placement
- Placement of Armor Cap material

3.2.1 Clearing and Grubbing

3.2.1.1 Description of Work

Contractor shall cut at the ground surface and remove surface vegetation from the cap areas in preparation for future surface grading and/or cap placement. Roots from vegetation 8 inches in diameter or smaller shall be grubbed and evenly distributed across the Western Cell prior to geotextile placement. The intent is to avoid uneven pockets of vegetative mass

under the cap. Roots from vegetation greater than 8 inches in diameter shall be grinded and spread evenly across the Western Cell.

3.2.1.2 Materials and Quantities

Not applicable to this Bid Item.

3.2.1.3 Assumptions and Restrictions

Contractor shall not pump water from the area to be cleared and grubbed into any surface waters, stream corridors, or wetlands; if water is pumped, it shall be collected and disposed off-site. Disposal of trees, brush, and other debris in any surface waters, stream corridors, wetlands, or at unspecified locations is prohibited. Open fires are not allowed.

3.2.1.4 Submittals

As part of the Contractor's CWP, Contractor shall provide description of equipment and methods proposed to complete the removal of vegetation. Include a description of methods to be employed to decontaminate trucks for hauling vegetation, or methods such as temporary haul roads to be employed to prevent contact between the trucks and paper mill sludge.

As part of the Contractor's CWP, Contractor shall also provide the name and location of the proposed facility for the disposal of removed vegetation.

3.2.1.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.2.2 Surface Grading

3.2.2.1 Description of Work

Contractor shall grade the surface of the Site to achieve the surface elevations specified on the Drawings. In addition, some areas of isolated grading may be required after clearing and grubbing are complete. If significant grading is to occur in the Western Cell, prior to commencing surface grading, the Contractor shall install an erosion control structure along the northwest portion of the Western Cell as shown on the Drawings.

3.2.2.2 Materials and Quantities

Contractor shall complete grading using existing earthen material from the perimeter berms surrounding the Western Cell. Based on existing Site topography data, approximately 200 cubic yards of material will require grading to achieve the elevations specified in the Drawings.

3.2.2.3 Assumptions and Restrictions

Earthwork for Site grading shall be completed using cut materials from the Site as shown on the Drawings. The intent is to keep all cut material on-site and use it as fill beneath the Armored Cap. If paper mill sludge is encountered during surface grading activities, the Contractor shall notify the Engineer immediately and provide recommendations for completing the surface grading activities while minimizing or eliminating the handling of the paper mill sludge.

The cut material shall be placed in an initial lift resulting in a 24-inch maximum horizontal layer, compacted with at least three passes of crawler-type tractors or power-drive tampers. Subsequent lifts shall be placed in 12-inch maximum horizontal layers and compacted in the same manner.

Contractor shall not pump water from the area to be graded into any surface waters, stream corridors, or wetlands; if water is pumped, it shall be collected and disposed off-site.

Contractor shall employ best management practices (BMPs) for TESCs in the work area to prevent the loss of soil due to natural causes such as storm events, surface water runoff, and wind, and to prevent the introduction of sediment to adjacent wetlands or water bodies.

The final surface elevations for the graded area must be within ± 0.25 foot of the elevations specified on the Drawings.

3.2.2.4 Submittals

As part of the Contractor's CWP, Contractor shall provide description of equipment and methods proposed to complete surface grading of the Site, and provide description of TESCs to be employed during surface grading activities.

3.2.2.5 Measurement and Payment

This Bid Item will be measured on a lump sum basis. Payment will be made on review and acceptance by Engineer for the total value listed for this Bid Item on the Bid Form. Progress payments may be made based upon estimated percent complete as requested in Contractor's Application for Payment and approved by Engineer.

3.2.3 Filter Geotextile

3.2.3.1 Description of Work

Prior to placement of the Armor Cap material, a geotextile shall be placed atop the surface, below the Armored Caps as shown on the Drawings. Geotextile panels shall overlap by a minimum of 3 feet. The geotextile shall be placed atop the mud line where grading did not occur. The geotextile shall be placed atop the graded surface in the Western Cell following acceptance of the graded surface by Engineer. The geotextile shall be anchored per manufacturer's recommendations on slopes to prevent creep of the geotextile down slope.

3.2.3.2 Materials and Quantities

The Filter Geotextile shall be Mirafi 1120N or equivalent.

3.2.3.3 Assumptions and Restrictions

The Contractor shall propose a method to the Engineer that confirms the minimum 3 feet of overlap was obtained and present it in the CWP and CQAP.

The Filter Geotextile will be used under all Armored Caps except beneath Armor Cap A in the Northwestern Area.

Water quality monitoring will be conducted by the Engineer and will occur during in-water activities as described in the Bid Item for Environmental Protection. In-water construction operations shall be adjusted to meet water quality criteria if water quality exceedances occur during geotextile placement. Armored Caps on slopes shall be placed from the toe of the slope upward.

3.2.3.4 Submittals

As part of CWP, include product information sheet for Contractor's proposed Filter Geotextile.

3.2.3.5 Measurement and Payment

This Bid Item will be measured per square yard of geotextile furnished and installed. The per square yard unit rate shall be extended by the estimated bid quantity to establish a Lump Sum Cost. Square yardage will be measured based on the size of the upland and in-water installation areas; overlapping panel quantities or delivered quantities of geotextile to the Site will not be considered as a basis for measurement and payment.

3.2.4 Geomembrane Placement

3.2.4.1 Description of Work

The seamed geomembrane shall be installed to the extents shown on the Drawings. The geomembrane shall be placed in such a manner to minimize resuspension of sediment or damage the geomembrane. The Contractor shall develop and implement quality control/quality assurance methods in conformance with manufacturer's recommendations to monitor proper installation, seam construction, and membrane protection. Seam welds shall

be tested according to ASTM D 6365 (Nondestructive Testing of Geomembranes using the Spark Test), unless an alternate method is proposed by the Contractor and approved by the Engineer.

3.2.4.2 Materials and Quantities

The geomembrane shall be linear low density polyethylene (LLDPE), 40 mil thickness, or equivalent. Prior to installation, geomembrane materials shall be stored and handled in such a fashion as to protect them from damage due to construction, weather, chemicals, excess temperature, and extended exposure to ultraviolet radiation. The Contractor shall protect the geomembrane from damage due to subgrade conditions and from damage due to the overlying armor materials using either a sand layer or cushion geotextile per the manufacturer's recommendation and as directed by the Engineer. Vents shall be installed as shown on the drawings and installed per the manufacturer's recommendations.

3.2.4.3 Assumptions and Restrictions

The geomembrane shall be placed following the manufacturer's recommendations for the following:

- Subgrade preparation
- Placing of the geomembrane
- Seaming of the membrane
- Anchoring of the membrane

The geomembrane shall be anchored on all sides to prevent the edge from being exposed. If an anchor trench is used along the north side, all excavated materials shall be managed onsite and placed in an even lift thickness below the geomembrane. The Contractor shall not operate heavy equipment directly on the surface of the installed geomembrane.

3.2.4.4 Submittals

As part of CWP, include Contractor's proposed source for the materials. Include, at a minimum, the company name, address, and phone number for the proposed source(s).

As part of Contractor's daily CQC report, include a photocopy of delivery tickets for the different materials transported to the Site and documentation on seam integrity testing. Daily CQC reports shall be submitted by noon on the following work day.

3.2.4.5 Measurement and Payment

This Bid Item will be measured per square yard of geomembrane installed. The price shall include all necessary cushion materials above and below the geomembrane. The per square yard unit rate shall be extended by the estimated bid quantity to establish a Lump Sum Cost. Square yardage will be measured based on the size of the installation areas.

3.2.5 Armored Cap Construction

3.2.5.1 Description of Work

The Armored Cap shall be constructed to the extents and thickness shown on the Drawings with the different materials identified on the Drawings. The Armored Cap shall be placed in such a manner to minimize resuspension of sediments or damage to the geotextile. All cap material placed on slopes must be placed from the toe of the slope up towards the crest.

The Contractor shall establish procedures for monitoring the rate of material placement, including the use of a positioning system, and methods for determining the rate of material placed. The Contractor shall also develop quality control/quality assurance methods to monitor placement rates and thickness.

3.2.5.2 Materials and Quantities

There are 4 different Armor Cap material gradations as defined below:

- Armor Cap Material A:
 - 80 percent by weight of well graded recycled concrete or crushed natural rock with the following gradation requirements:
 - 100% passing 6 inches
 - No more than 50% passing 3 inches
 - No more than 4% passing the #200 sieve

- 20 percent by weight of gravelly sand with the following gradation requirements:
 - 100% passing 3/8-inch sieve
 - 50% to 90% passing the #4 sieve
 - 10% to 40% passing the #10 sieve
 - No more than 4% passing the #200 sieve
- Armor Cap Material B/C. Well graded recycled concrete or crushed natural rock with the following gradation requirements:
 - 100% passing 12 inches
 - No more than 50% passing 6 inches
 - No more than 4% passing the #200 sieve
- Armor Cap Material C. Well graded crushed natural rock with the following gradation requirements:
 - 100% passing 12 inches
 - No more than 50% passing 6 inches
 - No more than 4% passing the #200 sieve
- Armor Cap Material D and D(24). Well graded crushed natural rock with the following gradation requirements:
 - 100% passing 18 inches
 - No more than 50% passing 8 inches
 - No more than 4% passing the #200 sieve

The Armor Cap materials shall be clean, granular material free of roots, organic material, contaminants, and all other deleterious and objectionable material. Samples will need to be analyzed by the Contractor for the list of analytes in Table 1.

3.2.5.3 Assumptions and Restrictions

Use of spuds will not be allowed in areas previously capped.

If the Armor Cap material proposed by the Contractor requires on-site mixing of two or more borrow materials, the Contractor shall be responsible for identifying and maintaining an on-site area for Armor Cap material mixing and stockpiling. The Contractor shall mix the

borrow materials to the satisfaction of the Engineer prior to placement. Contractor's costs for mixing of borrow materials are incidental to the Bid Item.

The Armor Materials shall be placed in such a manner as to prevent damage to the geomembrane and geotextile materials.

Water quality monitoring will be conducted by the Engineer and will occur during in-water activities as described in the Bid Item for Environmental Protection. In-water construction operations shall be adjusted to meet water quality criteria if water quality exceedances occur during material placement.

3.2.5.4 Submittals

As part of CWP, include Contractor's proposed source for the different Armor Cap materials. Include, at a minimum, the company name, address, and phone number for the proposed source(s), material gradation curves, and laboratory analytical results for the samples analyzed as described in Section 3.2.4.2. For Armor Cap Material A, the Contractor shall submit separate gradation analyses for the crushed rock component, the sand component, and the mixed material and a brief description of proposed methods for blending these materials to achieve the required 80/20 weight ratio of crushed rock to sand.

As part of Contractor's daily CQC report, include a photocopy of weigh tickets for Armor Cap materials transported to the Site. Daily CQC reports shall be submitted by noon on the following work day.

3.2.5.5 Measurement and Payment

This Bid Item will be measured per ton of Armored Cap materials furnished and constructed. The per ton unit rate shall be extended by the estimated bid quantity to establish a Lump Sum Cost. Tonnage will be based on weight slips provided by the approved borrow source. The per ton unit rate for Armor Cap materials shall be established for each type of Armored Cap material and for each method of placement, as follows:

- Armor Cap Material A
- Armor Cap Material B/C

- Armor Cap Material C
- Armor Cap Material D

For payment purposes, an overplacement allowance of up to 6 inches will be given to account for the accuracy of placing the material below elevation 2 feet NAVD 88. No overplacement allowance will be given for materials placed above elevation 2 feet NAVD 88. This overplacement allowance is included in the quantity provided in the Bid Table (Table 2).

4 SUMMARY OF SUBMITTALS

A summary of the submittals required by these Technical Specifications is provided in the Construction Quality Assurance Plan (CQAP), which is Attachment G to the RAWP.

5 REFERENCES

Texas Department of Transportation, 2004. Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges. Adopted by the Texas Department of Transportation June 1, 2004.

TABLES

Table 1 Armored Cap Material Analyte List

Parameter	Analytical Method	Reporting Limit (mg/kg)	TCEQ Tier I Residential Soil PCLs ⁽¹⁾ (mg/kg)	TRRP Tier 1 Sediment PCLs (4) (mg/kg)	TCEQ Marine PEL ⁽⁵⁾ (mg/kg)	Required Fill Chemical Concentration Criteria (mg/kg)
Metals	•					
Aluminum	6010B/6020	10	6.4E+04	150000	NL	6.4E+04
Antimony	6010B/6020	0.5	2.7E+00	83	NL	2.7E+00
Arsenic	6010B/6020	5.0	2.5E+00	110	41.6	4.2E+01
Cadmium	6010B/6020	0.50	7.5E-01	1100	4.21	4.2E+00
Chromium	6010B/6020	0.50	1.2E+03	36000	160.4	1.6E+02
Copper	6010B/6020	1.00	5.2E+02	21000	108.2	1.1E+02
Lead	6010B/6020	2.0	1.5E+00	500	112.18	1.1E+02
Mercury	7471A	0.020	3.9E-03	34	0.696	7.0E-01
Nickel	6010B/6020	2.0	7.9E+01	1400	42.8	4.3E+01
Silver	6010B/6020	0.50	2.4E-01	350	1.77	1.8E+00
Zinc	6010B/6020	5.0	1.2E+03	76000	271	2.7E+02
Semivolatile Organic Compounds		•				
1,2,4-Trichlorobenzene	8270C	0.10	2.4E+00	1500		2.4E+00
1,2-Dichlorobenzene	8270C	0.10	8.9E+00	66000		8.9E+00
1,3-Dichlorobenzene	8270C	0.10	3.4E+00	22000		3.4E+00
1,4-Dichlorobenzene	8270C	0.10	1.1E+00	2300		1.1E+00
2,4-Dimethylphenol	8270C	0.10	1.6E+00	3100		1.6E+00
2-Methylnaphthalene	8270C	0.10	8.5E+00	2500	NL	8.5E+00
2-Methylphenol	8270C	0.10	3.6E+00	7700		3.6E+00
4-Methylphenol	8270C	0.10	3.2E-01	770		3.2E-01
Acenaphthene	8270C	0.01	1.2E+02	7400	0.0889	8.9E-02
Acenaphthylene	8270C	0.10	2.0E+02	7400	0.12787	1.3E-01
Anthracene	8270C	0.10	3.4E+03	37000	0.245	2.5E-01
Benz[a]anthracene	8270C	0.10	5.6E+00	16	0.69253	6.9E-01
Benzo[a]pyrene	8270C	0.10	5.6E-01	1.6	0.76322	5.6E-01
Benzo[b]fluoranthene	8270C	0.10	5.7E+00	16		5.7E+00
Benzo[g,h,i]perylene	8270C	0.10	1.8E+03	3700		1.8E+03
Benzo[k]fluoranthene	8270C	0.10	5.7E+01	160		5.7E+01
Benzoic acid	8270C	0.60	9.5E+01	610000	NL	9.5E+01
Benzyl alcohol	8270C	0.10	2.9E+00	46000	NL	2.9E+00
Bis[2-ethylhexyl]phthalate	8270C	0.10	4.3E+01	240		4.3E+01
Butyl benzyl phthalate	8270C	0.10	1.3E+02	31000		1.3E+02
Chrysene	8270C	0.10	5.6E+02	1600	0.84598	8.5E-01
Dibenz[a,h]anthracene	8270C	0.10	5.5E-01	1.6	0.13461	1.3E-01
Diethyl phthalate	8270C	0.10	7.8E+01	120000		7.8E+01
Dimethyl phthalate	8270C	0.10	3.1E+01	120000		3.1E+01
Di-n-butyl phthalate	8270C	0.10	1.7E+03	15000		1.7E+03
Di-n-octyl phthalate	8270C	0.10	1.3E+03	3100		1.3E+03
Fluoranthene	8270C	0.10	9.6E+02	4900	1.49354	1.5E+00
Fluorene	8270C	0.10	1.5E+02	4900	0.14435	1.4E-01
Hexachlorobenzene	8270C	0.10	5.6E-01	8.9	NL	5.6E-01
Hexachlorobutadiene	8270C	0.10	1.6E+00	31		1.6E+00
Hexachloroethane	8270C	0.10	9.2E-01	150		9.2E-01
Indeno[1,2,3-c,d]pyrene	8270C	0.10	5.7E+00	16		5.7E+00
Naphthalene	8270C	0.10	1.6E+01	2500	0.39064	3.9E-01
N-nitrosodiphenylamine	8270C	0.10	1.4E+00	900		1.4E+00
Pentachlorophenol	8270C	0.10	9.2E-03	56		9.2E-03

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Phenanthrene	8270C	0.10	2.1E+02	3700	0.54353	5.4E-01
Phenol	8270C	0.10	9.6E+00	92000		9.6E+00
Pyrene	8270C	0.10	5.6E+02	3700	1.3976	1.4E+00
Volatile Organic Compounds (VOCs)						
1,1,1,2-Tetrachloroethane	8260B	0.0050	7.1E-01	2100	NL	7.1E-01
1,1,1-Trichloroethane	8260B	0.0050	8.1E-01	150000		8.1E-01
1,1,2,2-Tetrachloroethane	8260B	0.0050	1.2E-02	270		1.2E-02
1,1,2-Trichloroethane	8260B	0.0050	1.0E-02	960		1.0E-02
1,1-Dichloroethane	8260B	0.0050	9.2E+00	73000		9.2E+00
1,1-Dichloroethene	8260B	0.0050	2.5E-02	91		2.5E-02
1,1-Dichloropropene	8260B	0.0050	6.7E-02	540	NL	6.7E-02
1,2,3-Trichlorobenzene	8260B	0.0050	1.3E+01	460	NL	1.3E+01
1,2,3-Trichloropropane	8260B	0.0050	2.7E-04	7.8	NL	2.7E-04
1,2,4-Trimethylbenzene	8260B	0.0050	4.9E+00	37000	NL	4.9E+00
1,2-Dibromo-3-chloropropane	8260B	0.0100	8.7E-04	10	NL	8.7E-04
1,2-Dichloroethane	8260B	0.0050	6.9E-03	600		6.9E-03
1,2-Dichloropropane	8260B	0.0050	1.1E-02	800		1.1E-02
1,3,5-Trimethylbenzene	8260B	0.0050	2.7E+01	37000	NL	2.7E+01
1,3-Dichloropropane	8260B	0.0050	3.2E-02	540	NL	3.2E-02
1,4-Dichlorobenzene	8260B	0.0050	1.1E+00	2300	NL	1.1E+00
2,2-Dichloropropane	8260B	0.0050	6.0E-02	800	NL	6.0E-02
2-Butanone	8260B	0.0250	1.5E+01	440000	NL	1.5E+01
2-Chlorotoluene	8260B	0.0050	4.5E+00	3100	NL	4.5E+00
2-Hexanone	8260B	0.0250	1.6E-01	44000	NL	1.6E-01
4-Chlorotoluene	8260B	0.0050	2.5E+00	15000	NL	2.5E+00
4-Isopropyltoluene	8260B	0.0050	NL	NL	NL	
4-Methyl-2-Pentanone	8260B	0.0250	2.5E+00	59000	NL	2.5E+00
Acetone	8260B	0.0500	2.1E+01	73000	NL	2.1E+01
Benzene	8260B	0.0050	1.3E-02	990		1.3E-02
Bromobenzene	8260B	0.0050	1.2E+00	15000	NL	1.2E+00
Bromochloromethane	8260B	0.0050	1.5E+00	29000	NL	1.5E+00
Bromodichloromethane	8260B	0.0050	3.3E-02	880	NL	3.3E-02
Bromoethane	8260B	0.0100	NL	NL	NL	
Bromoform	8260B	0.0050	3.2E-01	6900		3.2E-01
Bromomethane	8260B	0.0100	6.5E-02	1000		6.5E-02
Carbon Disulfide	8260B	0.0050	6.8E+00	73000	NL	6.8E+00
Carbon Tetrachloride	8260B	0.0050	3.1E-02	420		3.1E-02
Chlorobenzene	8260B	0.0050	5.5E-01	15000		5.5E-01
Chloroethane	8260B	0.0100	1.5E+01	290000		1.5E+01
Chloroform	8260B	0.0050	5.1E-01	7300		5.1E-01
Chloromethane	8260B	0.0100	2.0E-01	4200		2.0E-01
cis-1,2-Dichloroethene	8260B	0.0050	1.2E-01	7300	NL	1.2E-01
cis-1,3-Dichloropropene	8260B	0.0050	3.3E-03	73		3.3E-03
Dibromochloromethane	8260B	0.0050	2.5E-02	650		2.5E-02
Dibromomethane	8260B	0.0050	5.6E-01	7300	NL	5.6E-01
Dichlorodifluoromethane	8260B	0.0050	1.2E+02	150000	NL	1.2E+02
Ethylbenzene	8260B	0.0050	3.8E+00	73000		3.8E+00
Ethylene Dibromide	8260B	0.0050	1.0E-04	0.64	NL	1.0E-04

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Isopropylbenzene	8260B	0.0050	1.7E+02	73000	NL	1.7E+02
m,p-Xylene	8260B	0.0100	5.3E+01	1000000		5.3E+01
Methyl tert-Butyl Ether	8260B	0.0500	3.1E-01	7300	NL	3.1E-01
Methylene Chloride	8260B	0.0050	6.5E-03	7300		6.5E-03
Naphthalene	8260B	0.0050	1.6E+01	2500	NL	1.6E+01
n-Butylbenzene	8260B	0.0050	6.1E+01	6100	NL	6.1E+01
n-Propylbenzene	8260B	0.0050	2.2E+01	29000	NL	2.2E+01
o-Xylene	8260B	0.0050	3.5E+01	1000000		3.5E+01
sec-Butylbenzene	8260B	0.0050	4.2E+01	29000	NL	4.2E+01
Styrene	8260B	0.0050	1.6E+00	150000	NL	1.6E+00
tert-Butylbenzene	8260B	0.0050	5.0E+01	29000	NL	5.0E+01
Tetrachloroethene	8260B	0.0050	2.5E-02	1000		2.5E-02
Toluene	8260B	0.0050	4.1E+00	150000		4.1E+00
trans-1,2-Dichloroethene	8260B	0.0050	2.5E-01	15000		2.5E-01
trans-1,3-Dichloropropene	8260B	0.0050	1.8E-02	540		1.8E-02
Trichloroethene	8260B	0.0050	1.7E-02	4400		1.7E-02
Trichlorofluoromethane	8260B	0.0050	6.4E+01	220000	NL	6.4E+01
Vinyl Chloride	8260B	0.0100	1.1E-02	36		1.1E-02
Organochlorine Pesticides	<u>I</u>					
DDD	8081A	0.0050	6.5E+00	120		6.5E+00
DDE	8081A	0.0050	5.9E+00	87		5.9E+00
DDT	8081A	0.0050	5.4E+00	87	0.0517	5.2E-02
Aldrin	8081A	0.0050	5.0E-02	0.84		5.0E-02
Dieldrin	8081A	0.0010	2.4E-02	0.89	0.0043	4.3E-03
alpha-BHC	8081A	0.0005	4.0E-03	4.1		4.0E-03
beta-BHC	8081A	0.0050	1.4E-02	14		1.4E-02
delta-BHC	8081A	0.0050	8.7E-02	14		8.7E-02
gamma-BHC (Lindane)	8081A	0.0005	4.6E-03	20	0.00099	9.9E-04
alpha-Chlordane	8081A	0.0050	1.3E+01	41	NL	1.3E+01
gamma-Chlordane	8081A	0.0050	7.3E+00	73	NL	7.3E+00
alpha-Endosulfan	8081A	0.0050	2.3E+00	310		2.3E+00
beta-Endosulfan	8081A	0.0050	2.3E+00	920		2.3E+00
Endosulfan sulfate	8081A	0.0050	3.8E+02	920		3.8E+02
Endrin	8081A	0.0050	3.8E-01	46		3.8E-01
Endrin aldehyde	8081A	0.0050	1.9E+01	46	NL	1.9E+01
Endrin ketone	8081A	0.0050	1.9E+01	46	NL	1.9E+01
Heptachlor	8081A	0.0050	9.4E-02	3.2		9.4E-02
Heptachlor epoxide	8081A	0.0050	2.9E-02	1.6		2.9E-02
Methoxychlor	8081A	0.010	6.2E+01	770		6.2E+01
Mirex	8081A	0.0050	1.3E+01	NL		1.3E+01
cis-Nonachlor	8081A	0.0050	5.6E+00	41	NL	5.6E+00
Oxychlordane	8081A	0.0050	5.6E+00	41	NL	5.6E+00
Toxaphene	8081A	0.20	1.2E+00	13		1.2E+00
Trans-Nonachlor	8081A	0.0050	5.6E+00	41	NL	5.6E+00
Chlorinated Herbicides					-	
2,4,5-T	8151	0.020	NL	NL		
2,4-D	8151	0.050	NL	2500		2.5E+03
2,4-D	8151	0.20	NL	2500		2.5E+03

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Dalapon	8151	0.500	2.9E-01	4600	NL	2.9E-01			
Dicamba	8151	0.020	7.3E-01	4600	NL	7.3E-01			
Dichlorprop	8151	0.050	2.3E-01	1500	NL	2.3E-01			
Dinoseb	8151	0.025	1.8E-01	150	NL	1.8E-01			
MCPA	8151	1	1.2E-02	77	NL	1.2E-02			
MCPP	8151	1	2.3E-02	150	NL	2.3E-02			
Silvex	8151	0.020	2.6E+00	1200	NL	2.6E+00			
Polychlorinated Biphenyls (PCBs)									
Total PCBs	8082	0.070	1.1E+00	2.3	0.1887	1.9E-01			
Dioxin/Furans, ng/kg									
Dioxins		ng/kg ⁽²⁾	ng/kg ⁽²⁾	ng/kg ⁽²⁾	ng/kg ⁽²⁾	ng/kg ⁽²⁾			
2,3,7,8-TCDD	1613B	1.0	(3)	(3)	NL	(3)			
1,2,3,7,8-PeCDD	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,4,7,8-HxCDD	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,6,7,8-HxCDD	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,7,8,9-HxCDD	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,4,6,7,8-HpCDD	1613B	5.0	(3)	(3)	NL	(3)			
OCDD	1613B	10	(3)	(3)	NL	(3)			
Furans									
2,3,7,8-TCDF	1613B	1.0	(3)	(3)	NL	(3)			
1,2,3,7,8-PeCDF	1613B	5.0	(3)	(3)	NL	(3)			
2,3,4,7,8,-PeCDF	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,4,7,8-HxCDF	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,6,7,8-HxCDF	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,7,8,9-HxCDF	1613B	5.0	(3)	(3)	NL	(3)			
2,3,4,6,7,8-HxCDF	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,4,6,7,8-HpCDF	1613B	5.0	(3)	(3)	NL	(3)			
1,2,3,4,7,8,9-HpCDF	1613B	5.0	(3)	(3)	NL	(3)			
OCDF	1613B	10	(3)	(3)	NL	(3)			

Notes:

- 1. TCEQ TRRP Tier I Residential Soil PCL Values, 30-acre source area, includes Total Soil Combined and GW Soil Ingestion (Class 1) exposure routes.
- 2. Dioxin/furan concentrations expressed in ng/kg. All other concentrations in table expressed in mg/kg.
- 3. Acceptable dioxin/furan concentration is less than 0.45 ng/kg of 2,3,7,8-

TCDD and 5 ng/kg TEQ based on WHO 2005⁽⁶⁾ TEFs

- 4. TCEQ TRRP Tier 1 Sediment PCL Values, includes ingestion and dermal pathways $\,$
- 5. TCEQ Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data, 2004
- 6. Van den Berg et al. 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. Toxicological Sciences 93(2): 223-241.

NL - Not Listed

-- No value given